REMARKS

This Response is in reply to the final Office Action mailed on April 4, 2005. Claims 1, 4-6, 8-13 and 18 are pending. Claims 1 and 11 having been amended herein. Claims 2 and 15 have been canceled. Claims 3, 7, 14, 16 and 17 were previously canceled without prejudice. No new matter has been added. Entry and consideration of the amendments and following remarks is respectfully requested.

Claim Amendments

Independent claim 1 has been amended to recite "wherein the step of assigning a value to at least one variable representing a physical property affecting the bending of each of said at least two intermediate rolls comprises the step of assigning a value to the bending rigidity, mass, shape, and material of each of said at least two intermediate rolls; and further comprising computerized modeling using all essential elements of the multi-nip calender including all physical properties of the set of rolls and selecting a type and a position of each roll in the set of rolls; determining of regulation parameters based on the computerized modeling; regulating of the multi-nip calender assembled based on the computerized model assembled with the type and the position of each roll in the set of rolls." Independent claim 11 has been amended to recite "wherein the at least one physical property affecting the bending of each of said at least two intermediate rolls is the bending rigidity, mass, shape, and material of each of said at least two intermediate rolls; wherein the computing unit defines a computerized model using all essential elements of the multi-nip calender including all physical properties of the set of rolls and a type and a position of each roll in the set of rolls is selected; wherein the automation system regulates the multi-nip calender based on the computerized model assembled with the type and the position of each roll in the set of rolls." Please note that the features recited in claims 1 and 11 were allowable subject matter in corresponding European Patent EP 1017905 B1.

Rejection under 35 U.S.C. §112

Claims 1, 2, 4-6, 8-13, 15 and 18 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Claims 1 and 11 have been amended herein. The Applicants respectfully traverse the Examiner's position on the rejections. The automation system and the computing unit are for assigning at least one value to a variable representing a physical property affecting the bending of each of the at least two intermediate rolls and for adjusting at least one of the following to place the set of rolls in a state of equilibrium and a predetermined state of deflection. Support for claims 1 and 11 is described throughout the specification and particularly on pages 15-16 of the specification. In view of the amendments to the claims, it is respectfully requested that the Examiner's rejections under 35 U.S.C. §112 be withdrawn.

Rejections under 35 U.S.C. 35 U.S.C. §103(a)

Claims 1, 2, 4-6, 8-13, 15 and 18 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Koivukunnas et al. (5,438,920) in view of Schiel (5,226,357). The Examiner's rejections are respectfully traversed.

Independent claims 1 and 11 have been amended to recite the physical properties and specifically claim the automation system and computing unit. It is Applicant's contention that claims 1 and 11 of the present invention are patentable over Koivukunnas and Schiel because the cited references do not teach or suggest these features. By reason of their dependency on independent claims 1 and 11, the Applicants assert that claims 4-6, 8-13 and 18 are also patentable over the cited references. Claims 2 and 15 have been canceled therefore the rejection no longer applies.

The claimed invention according to claim 1 relates to a method for computing and regulating the distribution of linear load in a multi-nip calender and includes the step of assigning a value to at least one variable representing a physical property affecting the bending of each of the at least two intermediate rolls. The claimed invention also includes the steps of applying a first force to said at least two intermediate rolls by means of said variable-crown upper roll, applying a second force to

said at least two intermediate rolls by means of said variable-crown lower roll and applying a support force to each one of said at least two intermediate rolls by means of said support cylinders. The claimed invention further includes the step of adjusting at least one of the following to place the set of rolls in a state of equilibrium and a predetermined state of deflection: the first force, the second force, at least one of the support forces and at least one of the weight forces exerted on each of the at least two intermediate rolls, wherein the step of assigning a value to at least one variable representing a physical property affecting the bending of each of the at least two intermediate rolls comprises the step of assigning a value to the bending rigidity, mass, shape, and material of each of the at least two intermediate rolls. The claimed invention further comprises the steps of computerized modeling using all essential elements of the multi-nip calender including all physical properties of the set of rolls and selecting a type and a position of each roll in the set of rolls; determining of regulation parameters based on the computerized modeling; and regulating of the multi-nip calender assembled based on the computerized model assembled with the type and the position of each roll in the set of rolls.

The claimed invention according to independent claim 11 recites an arrangement for computing and regulating the distribution of linear load in a multi-nip calender that includes a variable-crown upper roll that applies a first force to at least two intermediate cylinders and a variable-crown lower roll that applies a second force to the at least two intermediate cylinders. The at least two intermediate rolls have support cylinders, the support cylinders apply a support force to each one of the at least two intermediate rolls. The set of rolls have bending lines which are curved downward. The arrangement also includes an automation system and a computing unit for assigning at least one value to a variable representing a physical property affecting the bending of each of the at least two intermediate rolls and for adjusting at least one of the following to place the set of rolls in a state of equilibrium and a predetermined state of deflection: the first force, the second force, at least one of the support forces and at least one of the weight forces exerted on each of the at least two intermediate rolls, wherein the at least one physical property affecting the bending of each of the at least two intermediate rolls is the bending rigidity, mass, shape, and material of each of the at

least two intermediate rolls. The computing unit defines a computerized model using all essential elements of the multi-nip calender including all physical properties of the set of rolls and a type and a position of each roll in the set of rolls is selected and the automation system regulates the multi-nip calender based on the computerized model assembled with the type and the position of each roll in the set of rolls.

In the present invention, it is possible to control and regulate each nip in the multi-nip calender separately, so that there can be different linear loads in each of the nips, i.e. if such a regulation is necessary. The regulation can be performed according to a desired paper grade and to the composition of the incoming web. In the calender the set of the intermediate rolls can be considered as a whole, whereby it is possible to increase loading to those nips in which the need for treatment and deformation of the web is greatest. In this respect, it is clear that the present invention is an improvement over Koivukunna and Schiel alone or in combination.

Koivukunnas shows a method and apparatus, in which a web to be calendered is passed through nips formed by a variable-crown upper roll, a variable-crown lower roll, and by at least two intermediate rolls arranged between the upper and lower rolls. Such rolls are used as the intermediate rolls in which the form of the natural deflection line produced by their own gravity is substantially equal.

However, Koivukunnas does not teach or suggest an arrangement for computing and regulating the distribution of linear load in a multi-nip calender as recited in claim 1 of the claimed invention. Koivukunnas does not take into account the properties of deflection of the rolls wherein the at least one physical property affecting the bending of each of the at least two intermediate rolls is the bending rigidity, mass, shape, and material of each of the at least two intermediate rolls. Specifically, Koivukunnas does not teach or suggest assigning a value to at least one variable representing a physical property affecting the bending of each of the at least two intermediate rolls as recited in independent claim 1 of the present invention. Nor does Koivukunnas teach or suggest an automation system and a computing unit for assigning at least one value to a variable representing a physical property affecting the bending of each of the at least two intermediate rolls as recited in

independent claim 11 of the present invention. Nor does Koivukunnas teach or suggest a detailed computerized calculation and modeling method and arrangement as recited in the claims. Thus, Koivukunnas fails to teach or suggest the claimed invention as recited in claims 1 and 11.

Schiel shows a multi-roll calender, in which a sag-compensation roll is used as the bottom roll of the calender only (column 5, lines 5-7). The sag-compensation roll is of the type in which a sag thereof is compensated by an internal pressure, i.e there is a pressurized chamber in the roll. Conversely, the arrangement to which the present invention is directed includes a variable-crown upper roll that applies a first force to the at least two intermediate rolls and a variable-crown lower roll that applies a second force to the at least two intermediate rolls. In addition the method according to the present invention includes the step of adjusting at least one of the following to place the set of rolls in a state of equilibrium and a predetermined state of deflection: the first force, the second force, at least one of the support forces and at least one of the weight forces exerted on each of the at least two intermediate rolls.

Schiel does not disclose variable-crown upper roll that applies a first force to the at least two intermediate rolls and a variable-crown lower roll that applies a second force to the at least two intermediate rolls in the manner of the claimed invention. Schiel does not take into account the properties of deflection of the rolls wherein the at least one physical property affecting the bending of each of the at least two intermediate rolls is the bending rigidity, mass, shape, and material of each of the at least two intermediate rolls. Furthermore, Schiel does not disclose adjusting at least one of the following to place the set of rolls in a state of equilibrium and a predetermined state of deflection: the first force, the second force, at least one of the support forces and at least one of the weight forces exerted on each of the at least two intermediate rolls in the manner of the claimed invention. Nor does Schiel teach or suggest a detailed computerized calculation and modeling method and arrangement as recited in the claims. Schiel only mentions the control computer on a general level stating that the computer may be used for calculations. Accordingly, Schiel fails to teach or suggest the claimed invention.

Thus, even if Schiel was combined with Koivukunnas, it would still fail to teach or suggest every feature of the claimed invention.

Accordingly, it is Applicants' contention that claims 1 and 11 of the present invention are not obvious and are therefore patentable over Koivukunnas in view of Schiel. By reason of their dependency on independent claims 1 and 11, the Applicants assert that claims 4-6, 8-13 and 18 are also patentable over Koivukunnas in view of Schiel. Therefore, it is respectfully requested that the obviousness rejections be withdrawn.

CONCLUSION

It is respectfully submitted, that in view of the amendments and remarks presented above, that the Examiners's rejection of the claims have been overcome and should be withdrawn.

Should any changes to the claims and/or specification be deemed necessary to place the application in condition for allowance, the Examiner is respectfully requested to contact the undersigned to discuss the same.

This Response is being filed with a Petition for a Two-Month extension of time. In the event that any other fees are required, the U.S. Patent and Trademark Office is specifically authorized to charge such fee to Deposit Account No. 50-0518 in the name of Steinberg & Raskin, P.C.

An early and favorable action on the merits is earnestly solicited.

Respectfully submitted,
STEINBERG & RASKIN, P.C.

By: Dona C. Edwards
Dona C. Edwards
Reg. No. 42,507

Steinberg & Raskin, P.C.
1140 Avenue of the Americas
New York, New York 10036
(212) 768–3800